

Air Force Materiel Command

Electronic Systems Center High Performance Computer Distributed Center Proposal OVERVIEW

14 March 2001

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Briefing Addresses ...



- **ESC High Performance Computing (HHP) Distributed Center (DC) Proposal to the DoD HPC Modernization Program (HPCMP)**
- **ESC is an Air Force Center of Excellence for Modeling and Simulation with Existing High Performance Computing Capability**
- **Proposed HPC Distribution Center**



HPC Modernization Program



- **“High performance computing (HPC) ... an important tool .. to provide technological advantage to the warfighter.**
- **The knowledge gained and the resulting high fidelity models and simulation enabled by HPC have been growing rapidly.**
- **Service and Agency validated requirements to support our scientists and engineers exceed our capabilities.**
- **To help address our users’ HPC needs, the High Performance Computing Modernization Program (HPCMP) operates four Major Shared Resource Centers (MSRCs) and provides high-speed networking services to connect the centers to each other and to the users.**
- **To supplement the MSRCs, the HPCMP established Distributed Centers (DCs) throughout the Department of Defense (DoD).”**



HPCC Vision and Objectives



Vision

- **To enable the United States to maintain its technology supremacy over our adversaries in weapon systems design and to foster the flow of this technology into warfighting support systems by raising DoD's R&D high performance computing and communications capabilities to a level equal to or greater than that available in the foremost academic research centers and industry**

Objectives

- **Establish a world class capability, within the DoD, to apply high performance computation to solve DoD problems**
- **Ensure military advantage and warfighting superiority on the 21st century battlefield through the use of high performance information technologies**
- **Strengthen national prominence and preeminence by advancing critical technologies and expertise in high performance computing**



HPC Distributed Centers



- **Distributed Centers (DCs) have been established to provide HPC capability to a specified local and remote portion of the HPC community**
- **DCs are typically modest-sized systems where there is a significant advantage to having a local HPC system where there is a potential for advancing DoD applications using investments in HPC capabilities and resources.**



Current ESC HPC Capability



- **Being Relocated in Building 1607 on Hanscom Air Force Base (ESC)**
 - **Two classified, controlled access, fully conditioned computer rooms**
 - **Second floor space is 2925 square feet**
 - **Contains four Silicon Graphics origin 2000 series computers with 28 processors and more than 35 Silicon Graphics, SUN, and NT workstations**
 - **Supported by robust ATM, Gigabit Ethernet, 10/100 Ethernet network**
- **ESC is connected to the SIMAF and SMC by a T-1 into SIPRNet and a 3 Mbyte PVC into the DISN-LES cloud.**



HPC Distributed Center



- **HPC Distributed Centers Include an Array of Scientific Computing Resources That Serve Scientists and Engineers**
 - DoD Science & Technology Programs
 - DoD Test & Evaluation Programs
- **HPC Distributed Centers Address Processing Problems That Only High Performance Computing can Solve**
 - Real-time Data Processing
 - Signal Image Processing
 - Embedded System Applications
 - Classified HPC Applications
- **HPC Distributed Centers Enhance the Prestige and High Tech Job Opportunities for the Organization, the Local Community, and the Service/Agency of the Host Sites**

Only 17 HPC Distributed Centers

None in New England, Nearest is Rome Labs



Impact Of An ESC HPC Distributed Center



- **The First HPC Distributed Center in New England**
- **Enhanced Value to US Air Force**
 - Increased AFMC Processing for Simulation Based Acquisition
 - Joint Synthetic Battlespace (Local and Distributed Events)
 - HPC for ESC World Class Modeling and Simulation Facility
 - Integration and Test
 - Local and Distributed Test & Evaluation Events
 - Integrated Command & Control (IC2) Infrastructure (Access)
 - Secure Facility to Support Classified Processing
 - Resources for ESC Expertise in High Performance Parallel Processing Technologies
- **Complements Massachusetts' World Class Technology Reputation**
 - MIT New Electrical Engineering Computer Science Facility
 - MIT Lincoln Laboratory
 - Other Boston-area Universities
 - Extends to Technology Corridor
 - MITRE, Sanders, Raytheon, Navy Newport, ...



Technology Transfer



Technology transfer - the sharing or transferring of information, data, hardware, personnel, services, facilities, or other scientific resources for the benefit of the private or public sector.

3 types of transfer activities

- **Spin-off activities** that demonstrate non-defense, e.g., commercial viability of technologies already developed or presently being developed for national security purposes.
- **Dual-use science and technology activities** that develop technologies having both defense and non-defense applications
- **Spin-on promotion activities** that demonstrate the national security utility of technologies developed outside the DoD.



Use Via Education Partnerships (EP)



- **The goal of an EP is to encourage and enhance the study of scientific disciplines at all levels of education**
- **An EP may be entered into by the government with a not-for-profit, university, or a local education agency**
- **Under EP arrangements, a government laboratory may**
 - **loan equipment**
 - **transfer laboratory equipment determined to be surplus**
 - **make laboratory personnel available to teach or assist in the development of programs or courses**
 - **involve faculty and students in laboratory research projects**
 - **help in developing a program under which students may be given academic credit for work on laboratory research projects**
 - **provide academic and career advice and assistance to students**



Use Via CRADA



- **Cooperative Research and Development Agreement (CRADA)**
- **CRADA May Exist Between the Government and**
 - **Industry**
 - **University**
 - **Not-for-profit,**
 - **State or Local Government**
- **Government may Contribute People, Equipment and Facilities, but No Money.**
- **Collaborating Party May Contribute the Same and May Provide Money to the Government for Reimbursement or Other Things If Required.**

Air Force Materiel Command



High Performance Computer Distributed Center Proposal OVERVIEW

March 14, 2001

**Presenter -Dave Timer
-TRW**

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Current ESC HPC Capability



- **Being Relocated in Building 1607 on Hanscom Air Force Base,**
- **Two classified, controlled access, fully conditioned computer rooms.**
 - **First floor Hardware in the Loop Test Facility (2600ft²)**
 - **The second floor space is Modeling, Simulation and Analysis Facility (2925 ft²)**
 - **4 Silicon Graphics origin 2000 series computers with 28 processors**
 - **35 Silicon Graphics, SUN, and NT workstations**
- **Communications**
 - **3 Mbyte PVC**
 - **4 Mbyte DREN (April 01)**
 - **10/100 Ethernet network.**
 - **T-1 into SIPRNet and a into the DISN-LES cloud.**

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ESC Distribution Center ESC Mission and Purposes



Mission

- Support technology development and integration across Air Force Materiel Command

PURPOSE

- Intelligence and Data Fusion
- Advanced Moving Target Indication (GMTI)
- Advanced Modeling and Simulation Technologies
- Next generation communication technologies
- Synthetic Battlespace
- Simulation Based Acquisition Support



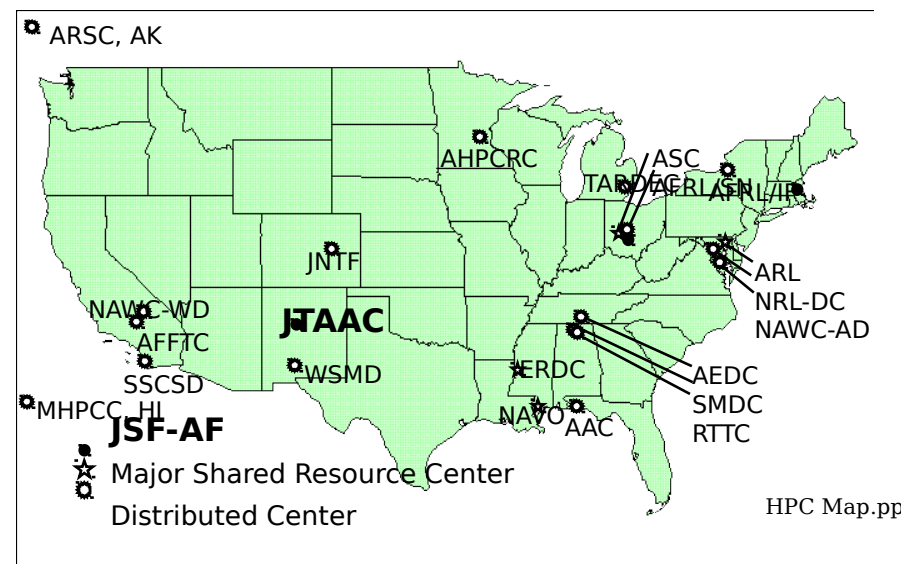
Proposed Architecture, Components, Functionality

AFMC

Architecture Components

- **Network Infrastructure/Connectivity**
 - DREN ATM Network (D3)
 - SIPRNet (T1)
 - NIPRNet (T1)
- **High Performance Computer HW**
 - Origin 3800
 - 192 processors
 - 1 GB RAM
 - 1.2 TB RAID Memory
- **System Models & Simulators**
 - C2ISR
 - Weapons/Platforms/Sensors
 - SAF/One-SAF
 - Threats
- **HWIL/SWIL Interface Drivers**
- **Event Process Infrastructure**
 - Planning / Scheduling
 - Analysis / Anal Planning
 - Execution ...
 - Federation Builder
 - Experiment Control
 - Data Collection
- **Configuration Management /**

HPC Centers



50% External Use



Proposal Schedule



- **Proposal Preparation & Submittal**
 - **15 December 00 - HPCMO Proposal Call**
 - **10 January 01 - Proposal Plan**
 - **7 March 01 - 1st Draft**
 - **23 March 01 Final Draft**
 - **4-6 April Air Force Prioritization Meeting**
 - **25 April Submit Proposal and Supporting Documents**
- **Proposal Evaluation Complete 4Q FY2001**
- **Post Selection Schedule ...**
 - **1Q FY 2002 Procurement Plan, Buy List & Life Cycle Costs Estimate**
 - **2Q FY2002 TEMP & Security Plan - Funds Released**
 - **3Q FY2002 Equipment Delivered & Installed**



ESC Commitment For An HPC Distributed Center



- **Genuine HPC Capability Need**
 - Validated Requirements in HPCMP Requirements Database
 - Qualification Justification for Corporate DoD Support
- **Willingness to Support Non-local Requirements**
- **Modest HPC Distributed Center (Site) Proposal Request**
 - <\$4M, One Year Funding
 - Acquire Commercial Systems
- **Garner Appropriate Political Support**
 - For the First HPC Distributed Center in New England
- **Memorandum of Support**
 - From Host Commander (ESC)
 - To Provide Operations and Sustainment Funding
 - Including All Hardware and Software Maintenance Costs
- **Viable Local Acquisition Strategy or Acquisition Plan**
 - Prior to Award
- **Procurement and Initial Implementation Plan (PIIP)**
 - Prepared Following Award
 - Addresses User Data Collection and Reporting Requirements
 - e.g., Against Performance Measures



Summary



Overview

HPC
Distributed
Center

ESC Capability

Proposed
Configuration

Proposal
Schedule

Summary

- **Air Force ESC is a Center of Excellence for Modeling and Simulation Located in the New England Region.**
- **A Successful Bid to Become one of the DoD HPC Distributed Center will Only Enhance ESC's Computing Capabilities**
- **As a Distributed Center ESC will have Connectivity to the Other DoD Distributed Centers and the Larger Major Shared Resource Centers**



HPCC Requirements



Outline for industry, government and academia to help list their requirements:

- What types of analysis are you doing?
- How do you use HPC to do your current analysis?
- What capabilities do you think you will require?
- Other information to help us to understand your desire and requirements for using HPC
- Where would they do the analysis?
 - -At your home office
 - -At ESC
 - -At home and ESC
- Where would you prefer to do your analysis?
- Would you come to ESC to perform your analysis?
- How might you use the HPCC resources at ESC?